

Portable Radio Fundamentals for CERT

Part 1 of 2

“Radio Fundamentals – Instructor Guide”

1> Some of you may have never used a portable 2-way radio before. Others of you may have learned sloppy radio procedures which could stand gentle correction. Whether you are “mike shy” or have simply gotten rusty in radio operating procedure and need a refresher in basics, this workshop should be helpful. Particularly, if you have never used a 2-way radio before, these materials will make doing so less intimidating and give you a quick-start to using your radio more effectively in an emergency.

2> You received a portable FRS radio as part of your CERT equipment. These are simple to use, but have limited power and range. Informal procedures work OK when you have few users and the radio channel isn’t busy. But operating during an emergency is different. When many users share a few channels, it is vital that the working frequency not be clogged by non-essential transmissions. We will teach the basics of radio discipline and operating procedures. If you will use a 2-way radio on a CERT team, please lead by example and teach others these recommended procedures.

3> The FCC created FRS as an unlicensed service for use by families and groups. FRS radios operate in the Ultra-High Frequency or UHF band. If you can see the house you want to talk to, FRS radios will work nicely. If talking within a mile or less of another vehicle and all you want to do is talk to that vehicle, FRS is great. Despite the advertising claims, reliable communication of over a mile using FRS is the exception and not the rule. FRS radios are limited by FCC regulation to 500 milliwatts (½ watt) of transmitter output. This is line-of-sight communication.

4> Licensing is how the FCC makes sure that applicants have selected the right radio service for their need. Radio spectrum is regulated to serve many interests, including business and public safety use. Licensing creates public records of licensees so that others seeking spectrum access can coordinate their use. Licensing ensures that an operator of a malfunctioning radio that is causing interference can be identified and advised of malfunctions more easily. The General Mobile Radio Service is intended to facilitate the personal business of the licensee and his/her immediate family. The GMRS can use more powerful portable and mobile radios which provide greater range and enable use of repeaters. Repeater enable county-wide coverage with a licensed portable or mobile radio. GMRS and FRS users can legally talk to each other.

5> Radios marketed as "FRS/GMRS" or "dual-service radios" are available from many retail or discount stores. The manual that comes with the radio, or the label placed on it by the manufacturer, should indicate which service the unit is certified for. If you cannot determine what service the unit may be used in, contact the manufacturer. The FCC grants five-year renewable licenses for GMRS Systems. To apply for a GMRS system license, you may file online through the [Universal Licensing System](#) (ULS), or file [FCC Form 605](#) manually. New filers can learn more about ULS in its [getting started tutorials](#). See Fee Requirements for FCC Form 605 ([PDF](#)) for current licensing fee information.

6> While most 2-way radios have similar features, different makes and models of radio vary in their controls and method of operation. FRS portables like the one you received in your CERT kit are simple and their controls are for the most part, intuitive. Public safety, business, GMRS and amateur or “ham” radios have more and different functions which can be confusing if you are unfamiliar with them. So you need to READ THE MANUAL and become familiar with the features on YOUR radio.

7> Portable radios should be turned off before removing the battery pack. Disconnecting the battery from a radio without turning it off first on many models will cause it to lose its memory or “personality.” The power on switch on some radios may be a push-button, on others it is combined with the volume control. To use the radio you must first ensure it has batteries or a battery pack installed and turn the radio “on.”

8> The channel selector on some radios is a set of “up-down” arrows, whereas on others it is a rotary knob with numeric indicators. In order to talk to others on your team, or to the command post, you need to know which radio frequency or “channel” they are on. It’s helpful to have a pre-established plan of suggested channel allocations. We will talk about that. Your team will be assigned a “primary” working channel for operations. Select the channel which you are assigned in the incident communication plan.

9> So-called “privacy codes” do NOT make your conversation private! Continuous Tone Coded Squelch or CTCSS enables multiple users to share the same channel without hearing each other, when each group selects a different tone. Tone squelch is used to exclude conversations from other groups you don’t want to hear when you must monitor the radio all the time. **We recommend that you use “carrier squelch” only!** This means turning off the tone feature so that you will hear EVERYONE who is using the channel. You don’t want to miss some one’s distress call because you had “tone on” and they didn’t.

10> In large incidents organized channel assignments are necessary. The low-power FRS channels 8 through 14 should be used for Intra-team communications between team members during search and rescue operations, and for inter-team communications for coordination purposes. Channels 1 through 7 are shared with the General Mobile Radio Service and can be used with higher-power radios for longer range communications between Group Leaders and the CERT Team Leader, or between Team Leaders and the Incident Command Post. Not all FRS radios have all 14 channels, but all FRS radios have at least Channel 1. The idea is that if AC mains power or telephones go out, neighbors would turn on their radio to Channel 1 and use it to contact Neighborhood Watch or emergency responders, including CERT. So in most cases we wouldn’t use FRS1 for CERT operations, but would use it to contact our neighbors to see who needs help.

11> Adjust the volume control until you can hear other users. If no one is on the air, you can open the “squelch” control until you hear “white noise” and adjust the volume from that.

12> When the squelch is wide open you will hear a loud, hissing white noise. On some radios the squelch control is a separate knob. On others it may be a concentric ring under the volume control. After you have adjusted the speaker volume to a level which you can hear, close the squelch control gradually until the noise just disappears.

13> The two-way radios we use for CERT all use a Push To Talk or PPT switch. You Push to Talk Release the PTT to listen. Please LISTEN more than you talk. If somebody seems to be in control of things, listen to and follow their instructions.

14> Most radios we use for CERT have a microphone co-located with the speaker. To speak press the PTT, then speak in a normal tone of voice. To Listen release the PTT. It's that simple.

15> To have reliable communications you must have fresh batteries in the radio. If the batteries are old or depleted you may be able to listen, but you won't be able to talk, because it takes more current for the radio to transmit. It's a good idea when storing your CERT gear to first turn off your radio, then remove and either replace or recharge the batteries. Always carry fresh batteries for your radio and at least one set of spares or an extra battery pack.

16> If your radio has a folding or telescoping antenna, ensure it is rotated vertical and fully extended. Hold your radio vertically at face level. When you use a detachable speaker-mike with the radio on your belt your body reduces the effectiveness of the signal. This is especially true with low powered FRS radios. A dangling microphone cord is liable to snag in debris and can be a hazard, so we don't recommend their use during search operations, it can be handy when you are in a safe, stationary location.

17> Controlled nets are necessary because 2-way radio is not like a telephone. You can't hear anyone else if YOU are talking. Nobody else can hear anybody but YOU when you are talking. If everybody tries to talk at once, NOBODY gets through, this results in chaos. The most important part of using a 2-way radio effectively is LISTENING, not talking!

18> If you take nothing else away from this workshop, please remember this:

- LISTEN more than you talk.
- WAIT until the channel is clear before speaking and speak on the radio ONLY if you have to
- THINK about what you are going to say
- USE PLAIN LANGUAGE, and
- Be BRIEF.
- If someone seems to be in charge... listen to them and do what they say.

19> Do not speak immediately upon pressing down on the push-to-talk, because your first syllable will probably get “clipped.” That is another reason we teach the prowords “This is” before identifying yourself. Portable radios also have a “battery-save” mode, which means that it takes a fraction of a second to change over from receive to transmit.

20> OK, let do a little demo (point out someone to demonstrate)

YOU (point to them) are the IC. Tell search team Ten (point over to them) to contact Medical on channel 14. Follow the directions on the slide...

Single Station Call

- 1. Voice the unit ID you are calling**
- 2. Then say the words “THIS IS”**
- 3. Followed by your unit ID**
- 4. Then say “OVER” (Invitation to reply).**

OK, how did they do?

21> Among an experienced group of radio operators, it may sound something like this... (Two experienced operators then do the demo)

Single Station Call - Example

The call “SEARCH TEN, THIS IS COMMAND, OVER”

The answer “THIS IS SEARCH TEN, GO AHEAD”

The response “CONTACT MEDICAL ON CHANNEL ONE FOUR, OVER”

The acknowledgement “SEARCH TEN CHANGING TO ONE FOUR FOR CONTACT, ROGER, OUT.”

Ok, let’s go over the “single station” call procedure again...

22> OK, to recap: After Control has given you permission to make a call to someone, say the Unit ID of the person you want to call... Then say “THIS IS” followed by your Unit ID Then say “OVER” - As in the example:

“P1 GARAGE, THIS IS P1 NORTH ELEVATOR, OVER.”

23> Answering a call to you is just as easy. Say “THIS IS” followed by your call sign, then acknowledge to the other station you are listening and ready to receive their traffic by using the pro words “Go ahead.” This demonstrates the fundamentals:

**WAIT
THINK
PLAIN LANGUAGE
KEEP IT BRIEF**

- 24> Use the “echo” technique to confirm and read back critical information. Ask for clarification, if needed. Read back critical information EXACTLY as you have written it down Ask the sender to CONFIRM that you have received and copied it correctly. Here are some other hints on good radio operating practice
- 25> Once Control gives you permission to call your station, be sure you have the other person’s attention before blurting out a long string of information. Acknowledge any calls directed to you, so that the other station knows you are listening and ready to copy.
- 26> Answer questions simply, using as few words as possible. If Control or the receiving station wants more detail, they will ask for it. Don’t give long explanations which tie up the channel. If you believe that additional information you have is vital for life, health and safety reasons, be as brief as possible. If you are on the receiving end of a message and don’t know who should get it, ASK before the other station finishes and maybe leaves the radio. If it is more expedient to let third parties need to speak directly to each other, then HAND THEM THE RADIO!
- 27> It is a natural reaction to speak louder when it is noisy around you, but that makes matters worse. An earphone is recommended in noisy environments, to help keep the ambient noise level down in crowded areas such as incident command posts where people need to concentrate.
- 28> If not using an earphone, turn down your speaker volume so that you don’t add any more to the ambient noise than is absolutely necessary. When transmitting, speak across the microphone element in a normal voice to minimize distracting breath sounds.
- 29> There are world-standard radio operating procedures recommended by the International Telecommunication Union and the International Civil Aviation Organization. The slides which follow describe the minimum, commonly recommended procedural words.
- 30> The basic four prowords that everyone should know are: “This is,” “Over,” “Go Ahead” and “Out.”

“THIS IS” - is always used when you identify. It makes it clear **WHO** is INITIATING the contact.

"OVER" - means that you are ready for the other person’s reply and it is their turn to speak

“GO AHEAD” - you are ready for the other person to speak so you can copy their message.

“OUT” - means that you are done and expect no further reply’

The station who initiates the contact should end it.

31> This is simple.

“**OVER**” says to the other person it is their turn to speak.

“**OUT**” means that you are done and no further reply is expected.

It’s considered “*bad form*” to say “**OVER and OUT**” together, it’s unnecessary. Just use one or the other.

Use “**OVER**” when you expect a reply.

Use “**OUT**” when you don’t, it’s that simple.

No go out and practice, we have a little exercise for you...

Break for Practical “Evolution”

Practical Exercise (15 min. in class for help and further instruction, coupled w/ class break for student hands-on play). Divide students into four teams, designated Red, **Green, Blue, Yellow** consisting of 3-5 members each.

Lab-A, casual simplex, conduct a “PAR-CHECK.” Instructions won’t provide specific channel assignments, but the CERTs will have been introduced to the concept of a communication plan in Part 1 and should figure out workable channel assignments on their own. During the “hot wash” after the exercise discuss how this worked. Student results offer feedback to the instructor on how effective he was in providing the basic concept information.

- Teams’ leaders conduct a roll call of members, to indicate their availability.
- Individual team members report their status to the team leader.
- Team leader relays the number of personnel available for assignment to Logistics at the Command Post.

32> ***Return from Break TIME FOR QUESTIONS Before We Start Part II***